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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/085,635	02/28/2002	Wing-Cheong Tang	5181-89200	5376

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Jeffrey C Hood
Meyertons Hood Kivlin Kowert & Goetzel PC
P O Box 398
Austin, TX 78767-0398

EXAMINER	
CHEN, PO WEI	
ART UNIT	**PAPER NUMBER**
2676	8

DATE MAILED: 04/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/085,635	TANG ET AL.	
	Examiner	Art Unit	
	Po-Wei (Dennis) Chen	2676	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *February 23, 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 7.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

In response to an Amendment received on February 23, 2004. This action is final.

Claims 1-24 are pending in this application. Claims 1, 8, 16-17, 23 and 24 are independent claims.

The present title of the invention is "End point value correction when traversing an edge using a quantized slope value".

The Group Art Unit of the Examiner case is now 2676. Please use the proper Art Unit number to help us serve you better.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4, 6-12, 14-19 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baker et al. (US 6,219,070; refer to as Baker herein) and further in view of Thayer (US 5,278,949).

3. Regarding claim 1, Baker discloses a method for adjusting pixel parameters by subpixel positioning comprising:

A method for rendering a polygon (lines 7-14 of column 1);

Receiving geometry data defining vertices of the polygon (lines 30-32 of column 10 and lines 35-39 of column 11 and Fig. 8), computing initial vertex x,y values at end points proximate to each of the vertices of the polygon (lines 47-56 of column 11);

Computing a slope along edge of the polygon (lines 61-63 of column 13 and lines 63-67 of column 14);

Interpolating x,y values along respective edge of the polygon, wherein said interpolating uses the computed slope along the respective edge of the polygon (lines 56-61 of column 13, lines 44-55 of column 16 and lines 49-63 of column 17);

Final x,y values for respective edge of the polygon, wherein, for respective edge, said final x,y values comprises the interpolated x,y values for non-end points of the respective edge, and said final x,y values comprises the computed initial vertex x,y values for each of the end points of the respective edge (lines 47-56 of column 11, lines 54-56 of column 18, lines 59-67 of column 19 and lines 1-4 of column 20; it is noted that the computed initial vertex is being tested to determine if the coordinate resides inside or along one of the triangle edges. If yes, then the computed initial vertex would be used as one of the coordinates instead of being further interpolated).

Baker does not disclose that each edge of the polygon is being processed and storing coordinate values. Thayer discloses a polygon renderer that utilizes the method (lines 67-68 of column 5, lines 1-41 of column 6, lines 63-66 of column 15 and lines 1-6 of column 16). It would have been obvious to one of ordinary skill in the art to utilize the teaching of Thayer to provide a very precise point sampling algorithm to determine which pixels of polygon will be rendered and reduced artifacts (lines 29-42 of column 5, Thayer). Also, both Baker and Thayer are directed to method of utilizing slopes to interpolate points along the edge of polygons.

4. Regarding claim 2, Baker discloses a method for adjusting pixel parameters by subpixel positioning comprising:

The computed initial vertex x,y values for each of the end points of the respective edge comprises replacing interpolated x,y values at the end points with the computed initial vertex x,y values (lines 47-56 of column 11, lines 59-67 of column 19 and lines 1-4 of column 20; it is noted that the computed initial vertex is being tested to determine if the coordinate resides inside or along one of the triangle edges. If yes, then the computed initial vertex would be used as one of the coordinates instead of interpolated vertex coordinates thus functioning as to replacing interpolated coordinate with the initial vertex).

Baker does not disclose storing coordinate values. However, this is known in the art taught by Thayer as statements presented above, with respect to claim 1 are incorporated herein.

5. Regarding claim 3, Baker discloses a method for adjusting pixel parameters by subpixel positioning comprising:

The computed initial vertex x,y values for each of the end points of the respective edge operates to prevent inclusion of an extraneous pixel and/or exclusion of a pixel within the Polygon (lines 46-56 of column 8, lines 43-63 of column 10, lines 19-36 of column 12 and lines 59-67 of column 19; it is noted that the initial vertex values of the end points of the respective edge are being computed to include pixels that lie within or at the boundary and to exclude pixels that are not).

6. Regarding claim 4, Baker discloses a method for adjusting pixel parameters by subpixel positioning comprising:

The computed slope is a quantized slope value (lines 61-66 of column 13; while claim recites quantized slope value, the term is broad enough to include the computed slope value disclosed by Baker).

7. Regarding claim 6, Baker discloses a method for adjusting pixel parameters by subpixel positioning comprising:

The final x,y values comprise pixels for the polygon (lines 54-56 of column 18).

8. Regarding claim 7, Baker discloses a method for adjusting pixel parameters by subpixel positioning comprising:

The polygon is a triangle (Fig. 9).

9. Regarding claims 8 and 9, statements presented above, with respect to claim 1 are incorporated herein. Furthermore, the vertex 504 and 502 correspond to first and second vertex (lines 47-56 of column 11 and Fig. 9, Baker).

10. Regarding claims 10-12 and 14-15, statements presented above, with respect to claims 2-4 and 6-7 are incorporated herein. Furthermore, edge 510 formed by vertex 504 and 502 correspond to first edge (lines 47-56 of column 11 and Fig. 9, Baker).

11. Regarding claim 16, statements presented above, with respect to claim 1 are incorporated herein. Furthermore, edge 510 formed by vertex 504 and 502 correspond to first edge (lines 47-56 of column 11 and Fig. 9, Baker).

12. Regarding claims 17, statements presented above, with respect to claims 1 are incorporated herein. Also, Baker disclose a vertex processor to receive and assemble vertex data (lines 28-36 of column 10 elements 128 and 134 of Fig. 7), a render system coupled to the vertex processor (elements 136 and 138 of Fig. 7; while claim recites a render system, the term is broad enough to include the edge and span walker which function to render the polygons) and a memory (element 124 of Fig. 7). Furthermore, edge 510 formed by vertex 504 and 502 disclosed by Baker correspond to first edge (lines 47-56 of column 11 and Fig. 9).

13. Regarding claims 18-19 and 21, statements presented above, with respect to claims 2-3 and 7 are incorporated herein. Furthermore, edge 510 formed by vertex 504 and 502 correspond to first edge (lines 47-56 of column 11 and Fig. 9, Baker).

14. Regarding claim 22, Baker discloses a method for adjusting pixel parameters by subpixel positioning comprising:

The render system comprises at least one edge walker for interpolating the x,y values along the first edge of the polygon (lines 56-61 of column 13 and lines 13-17 of column 18 and element 136 of Fig. 7).

15. Regarding claim 23, statements presented above, with respect to claim 1 are incorporated herein.

16. Regarding claim 24, statements presented above, with respect to claim 1 are incorporated herein. Furthermore, Baker discloses a method for adjusting pixel parameters by subpixel positioning comprising:

A method for triangle rendering (line 62 of column 3 to line 11 of column 4 and Fig. 5-6);

Interpolating x,y positions along the edge starting from the initial edge intercept and progressing towards a second vertex of the edges (line 12 of column 16 to line 61 of column 18 and lines 38-62 of column 21 and Fig. 12-13);

Data including (a) one or more of the interpolated x,y positions and (b) an x,y position of the second vertex as defined by the geometry data instead of one of the interpolated x,y positions which is proximate to the second vertex (lines 47-56 of column 11, lines 54-56 of column 18, lines 59-67 of column 19 and lines 1-4 of column 20; it is noted that the computed initial vertex

is being tested to determine if the coordinate resides inside or along one of the triangle edges. If yes, then the computed initial vertex would be used as one of the coordinates instead of being further interpolated. If not, then the interpolated position is used);

Baker does not disclose storing x,y position data and perform rendering computations on the triangle using the stored data. Thayer discloses a polygon renderer that utilizes the method (line 67 of column 5 to line 43 of column 7 and line 63 of column 15 to line 6 of column 16 and Fig. 2; it is noted that the display is filled or rendered with pixels which are on the inside of the polygon and the determination of pixels inside are processed using coordinates data stored). It would have been obvious to one of ordinary skill in the art to utilize the teaching of Thayer to provide a very precise point sampling algorithm to determine which pixels of polygon will be rendered and reduced artifacts (lines 29-42 of column 5, Thayer). Also, both Baker and Thayer are directed to method of utilizing slopes to interpolate points along the edge of polygons.

17. Claims 5, 13 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baker et al. (US 6,219,070; refer to as Baker herein) and Thayer (US 5,278,949) as applied to claim 1 above, and further in view of Dye (US 5,684,941).

18. Regarding claim 5, Baker does not discloses the slope value is represented by a quantized value having a first number of bits of precision, wherein the first number of bits of precision produce inaccuracies for interpolated x,y values computed at the end points of at least one edge of the polygon. Dye discloses an interpolation rendering of polygons into a pixel grid utilize the method (lines 50-53 of column 11, lines 20-40 of column 13 and lines 6-29 of column 14; it is noted that the slope calculated has fractional part corresponds to first number of bits of precision and the fractional part produces error when interpolation is processed). It would have been

obvious to one of ordinary skill in the art at the time of invention to utilize the teaching of Dye to provide a faster interpolation of polygons by simplifying the processing logic (lines 47-51 of column 6). Also, both Baker and Dye are directed to polygon interpolation utilizing slope and vertex values.

19. Regarding claims 13 and 20, statements presented above, with respect to claim 5 are incorporated herein. Furthermore, edge 510 formed by vertex 504 and 502 correspond to first edge (lines 47-56 of column 11 and Fig. 9, Baker).

Response to Arguments

20. Applicant's arguments filed February 28, 2004 have been fully considered but they are not persuasive.

The Applicant argues references do not teach or suggest "storing final x,y values comprises storing the computed initial vertex x,y values for each of the end points of the respective edge". However, this is known in the art taught by Baker in view of Thayer. Baker discloses a method for adjusting pixel parameters by subpixel positioning by utilizing interpolation process and determine if the coordinate reside inside or along of the triangle edges. If yes, then the computed initial vertex coordinate would be used. If not, then the interpolated position is used (lines 47-56 of column 11, lines 54-56 of column 18, lines 59-67 of column 19 and lines 1-4 of column 20). Baker does not disclose the coordinates are stored. Thayer discloses a polygon renderer that utilizes the method (line 67 of column 5 to line 43 of column 7 and line 63 of column 15 to line 6 of column 16 and Fig. 2; it is noted that the display is filled or rendered with pixels which are on the inside of the polygon and the determination of pixels inside are processed using coordinates data stored). It would have been obvious to one of

ordinary skill in the art to utilize the teaching of Thayer to provide a very precise point sampling algorithm to determine which pixels of polygon will be rendered and reduced artifacts (lines 29-42 of column 5, Thayer). Also, both Baker and Thayer are directed to method of utilizing slopes to interpolate points along the edge of polygons.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

21. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Inquiry

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Po-Wei (Dennis) Chen whose telephone number is (703) 305-8365. The examiner can normally be reached on Monday-Thursday from 8:30 AM to 7:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew C Bella can be reached on (703) 308-6829. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Po-Wei (Dennis) Chen
Examiner
Art Unit 2676

Po-Wei (Dennis) Chen
April 20, 2004

MATTHEW C. BELLA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600